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AUGUST 19, 1950

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

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MATHEMATICS-ENGINEERING

# From Now On: Computers

Electronic computers, mechanical brains, will push forward man's knowledge in the future. Their use will range from college laboratory to factory.

By WATSON DAVIS

*Twenty-first in a series of glances forward in science.*

➤ MOST of those who have struggled with arithmetic, algebra, and geometry in school welcome the idea of machines that do mathematics.

Actually mechanical aids to computation are an everyday story so far as simple addition, subtraction, multiplication and division are concerned. Adding machines go back to 1642 and a commercial multiplying machine was built as early as 1820 in France.

"Mechanical brain" development has been a top-priority undertaking since the war. The spur to the urgent interest in high speed automatic digital computing machines has come from their need in research, particularly for devices that would make us strong in case of war.

Take the problem of an attacking supersonic rocket or airplane. Quick as a wink it must be located by radar. Following its superfast path, a computing device must be linked to the complex machines for launching and guiding a countering missile to bring it down. Only a device faster than human figuring could do this. Thousands of other problems cry for similar speedy solutions.

Private industry, as well as the federal government, is investing considerable sums of money in the giant computing machines which largely stem from the famous ENIAC machine completed in 1945. Such devices differ from the ordinary computing machines you see in offices.

They are electronic in their action, for the most part. Tubes and circuits do the arithmetic. Then they must have a memory within themselves that stores up numbers and issues them on demand. A control portion keeps track and manages the whole operation. Then, of course, there must be a way to put information and orders into the machine and get the answers out of it, usually magnetic tape or punched cards.

The machines now building are very fast. They can make an addition in ten-millionths of a second. One trouble is that the best of them have a limited memory, the inner memory of ENIAC being only 20 numbers or orders.

Proud as the scientists are of these man-made "brains" they are quick to admit that in some respects they do not come within a million times of being the equal of the human brain. Our central nervous system has individual nerve cells that turn either on or off.

These are similar to what are called "flip-flop" circuits in the computers, which represent numbers in effect by saying "yes" or "no." The human nervous system has ten thousand million such elements, while the most complicated computer so far built has only about ten thousand.

Built on the principles of present computers, the vacuum tubes of an electronic brain the equal of a human one would take the power of Niagara to light its tubes

GENERAL SCIENCE

## Danger in Mobilization

*The following editorial reprinted from the Washington Daily News for Aug. 7 comments upon a Science Service article, "Use of Scientific Ability," that "reports a very real danger" (See SNL, July 29, p. 69 for the article.)*

➤ THE country's scientific research and applied sciences might be crippled by the present partial mobilization.

In our technological civilization, the importance of this danger can hardly be overemphasized. In fact, the problem probably is broader than the specific scientific areas discussed in the story.

An Army command naturally wants smart soldiers, because smart soldiers kill more of the enemy than dumb soldiers. This is an oversimplification, of course, of the military attitude, but it helps to accent the point; indiscriminate war use of men with comparatively rare talents could so denude a whole generation of its most intelligent members that a nation would seriously lag in the post-war peaceful competition in technological fields.

At present, manpower experts are trying to work out a stopgap program which would prevent blind drafting of specialists in science into the general Army pool.

It is a hard thing to say, and a hard thing to face, but it is certainly a misuse of manpower to send men trained in valuable special skills, men with special intelligence, into situations which could just as well be filled by men not having those qualities. A nation that romantically squanders its most intelligent and valuable members is undoubtedly handicapping itself in a race with a nation that refuses to use up its most intelligent members in such fashion.

Most men do not relish being thought of as hiders behind special technical ability in order to avoid their share of danger.

and Niagara's water flow to cool its tubes. Always, human brains control the mechanical ones.

For the future, if the expectations of experts are fulfilled, you may find:

A. Giant computers in every college and industrial research laboratory, working on almost all the problems in science's future.

B. Improvements in the memory systems and in the reliability or "accuracy" of the machines, which do make mistakes when they blow a tube, for instance.

C. Use of new devices to replace the electronic tubes, and thus make the computers more reliable and durable. There may be used semi-conductors like the transistor, magnetic devices that do not require power, or electro-chemical elements.

D. Use of computers as a part of complex manufacturing processes that will be operated with a minimum of human labor.

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But wars are getting more and more total, civilian populations get bombed as well as armies. Dangers are everywhere, and the onus on a man in a civilian job grows more imaginary than real with each succeeding war. Dangers increase everywhere. Besides, the onus on the individual can be removed by having certain governmental powers to allocate such men to special work, in and out of the services. If a man can best serve his country in a special job for which his intelligence and training especially fit him, his country will gain in the long run by having him stay there.

The problem is pressing, and we hope that some fair and sensible plan can be devised by the National Security Resources Board, the Defense Department and the draft boards, before too much damage is done to the nation's pool of technically qualified men.

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INVENTION

## Device Picks and Shells Corn

➤ SHELLED corn, not ears of corn, are delivered by an improved harvester that cuts the stalks, husks out the ears and shells them as the machine passes up and down the rows in the field.

It is a two-row tractor-mounted corn picker. The cut stalks pass through it. Snapping action separates ears from stalks to drop into the sheller. The shelled corn passes by conveyor to a truck in the rear.

Inventor is Edward R. Gerber, Stockton, Calif. The patent number is 2,518,302. Rights have passed to the International Harvester Company, Chicago.

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## NUTRITION

# Ice Cream and Bread Laws

Ice cream made with vegetable fat cannot be shipped across state lines for sale. Softeners for bread have been banned, but anti-mold agents may be used.

► THE ice cream people all over the land are consuming these hot August days may or may not be made from cream or milk fat. Some of it may be made of vegetable fat.

If so, it cannot now legally be shipped across state lines for sale, though it might be just as nourishing and taste just as good.

Orange and raspberry sherbets and fruit ices are in much the same situation. Some are made entirely from fruit juices, some are made partly from fruit juices and partly with citric acid and artificial coloring. These also may be just as refreshing to taste and just as wholesome, but cannot legally be sold in interstate commerce.

The reason is that their sale may be a "practice misleading to the consumer." The general provisions of the federal food, drug and cosmetic act call for purity and the use of safe ingredients in food and prohibit practices misleading to the consumer.

Next Nov. 13, when you may be thinking about ice cream for dessert for your Thanksgiving dinner, the Food and Drug Administration will conduct hearings on ice cream and frozen desserts. Object of the hearings will be to find out what health and nutrition authorities and manufacturers think should go into chocolate ice cream, raspberry sherbet and the rest of the frozen desserts. After that, uniform standards and definitions will be drawn.

Ice cream made and sold within a state must conform to state legal standards, but these vary considerably from state to state. Increasing interstate commerce in frozen desserts makes a uniform national standard desirable. Steps toward this were begun with Food and Drug hearings in January, 1942, but standards were not announced because War Food Administration regulations restricted the use of some of the materials used to prepare frozen desserts.

The mixes housewives buy for making their own ice cream and sherbet will not be considered in the coming hearings which are only on desserts sold in frozen form.

Bread, which has been going under a lengthy process of standard setting, is almost at the goal now. A tentative order for standards for various forms of the staff of life has now been issued. Any objections must be filed within 30 days. After that, the final order will be written.

Raisin bread may be fruitier, it appears from the tentative order. The standard under this order calls for the weight of the

raisins to be not less than half the weight of the flour.

Chemicals designed to make bread seem fresh longer, technically termed softeners or emulsifiers, are banned under the tentative order. Food and Drug officials decided the case for the safety of these ingredients was not sufficiently clear cut. Better a stale loaf than a possibly dangerous one, is the thinking.

Certain chemicals used to retard the growth of mold and other micro-organisms which cause spoilage may, however, be put into the bread. These chemicals are sodium and calcium propionates, sodium diacetate, lactic acid and mono calcium phosphate.

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## MEDICINE

## Drug for Stomach Ulcer Checks Excessive Sweating

► BANTHINE, new drug being used to treat stomach ulcer, can check excessive sweating of the hands, feet, underarms and other parts of the body. It can therefore be used in place of a not too satisfactory nerve-cutting operation to which patients with pronounced excessive sweating have resorted.

Good results in three such cases are reported by Drs. Keith S. Grimson, C. Keith Lyons, Wm. T. Watkins and K. Lamar Callaway of Duke University School of Medicine, Durham, N. C., in the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (Aug. 12) in Chicago, Ill.

The drug is taken by mouth in capsules about every four hours. The first patient who tried it learned to regulate the number of capsules according to the activities she had planned for the day.

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## MEDICINE-PHARMACY

## ACTH, Wonder Drug, Made From Cattle's Glands

► A WAY to get ACTH, one of the two modern wonder drugs for arthritis, from the pituitary glands of cattle has been developed by scientists at the research laboratories of the Frank W. Horner pharmaceutical manufacturing company in Montreal.

A greatly increased supply of the drug should result. Heretofore the only source of it has been pituitary glands of hogs. Extraction from beef pituitaries, though it

should yield more because of the larger size of the glands, was not considered practical.

The process of extracting the hormone from beef pituitaries is more complicated and more expensive. But, says Horner research director Dr. Leonard Mitchell, "we feel that when, as in this case, the cost is not a primary consideration, cattle glands represent a worthwhile source of this important research tool."

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## ENGINEERING

## Plastic Squares for Walls Installed by Amateurs

► FAMILIAR tile and fabric coverings for interior walls are now supplemented by a new plastic square which can be easily applied even by the housewife. The product is manufactured in Cresskill, N. J., by the Page Panel Company.

The 12-inch squares have bevelled edges and are tongued and grooved for perfect fit. They are made of high-quality insulating board, permanently covered with Velon plastic sheeting. Held in place by a special cement, the squares are easily cut to fit around window and door frames.

The advantages of a plastic wall, apart from its appearance, is that it is economical, durable and easily cleaned.

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**WONDERWALL, TWO IN ONE—**  
The new Velon plastic wall panel not only insulates but decorates. Being applied directly over cinder block walls in the above picture, it can also be installed on wood, plaster, brick or concrete. The tongued and grooved edges make perfect fit and alignment easy.



## MILITARY DEFENSE

# Troops Before Weapons

► WE should slow down the all-out development of weapons of mass destruction like the H-bomb if that is necessary for the provision of enough mobile forces to fight the new "warm" war.

This is the editorial opinion of the BULLETIN OF THE ATOMIC SCIENTISTS (July) as expressed by Eugene Rabinowitch, scientist and editor of the magazine.

Dr. Rabinowitch stated, "One fact has already been demonstrated. It is the utter uselessness of atomic weapons in the present stage of our power contest with the Soviet Union."

The editor called this stage the "warm" war—an intermediate stage between the "cold" and "hot" wars. He said that the atomic weapons would also be useless if the warm war were to extend to other satellite countries, with the Soviet Union remaining "neutral."

"Everywhere, we would be facing the question," he pointed out, "of how to protect a country from subjugation . . . without decimating its people."

"If we concentrate on fabrication of weapons of mass destruction and do not balance this development by the creation of a sufficiently large, well supplied and strategically distributed land force, we will run a double danger," the editor said. He saw those two dangers as "losing out in the peripheral skirmishes with Soviet satellites . . ." and depriving ourselves of "freedom of decision in the event of an open Soviet aggression."

The NEWSLETTER OF THE FEDERATION OF AMERICAN SCIENTISTS (July 19) also came out against using the A-bomb in Korea. An article by Dr. Clifford Grobstein, an officer of the Federation, declared:

"It is the avowed UN intention to localize the conflict in Korea. Good police action is not punitive action; its legitimate objective is coping with the aggressor to restore the status quo ante. This the bomb could never do."

Dr. Grobstein asked the U. S. to lead in organizing major constructive UN action to eliminate the causes of aggression.

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## PSYCHIATRY

## World Peace Can Be Helped by Psychiatry

► PSYCHIATRY can help point out the road to world peace. It can do this by providing a "better understanding of emotion as it operates in the human personality, and the way it colors or inhibits our judgment."

This was the opinion voiced in Topeka, Kans., by Drs. William C. and Karl Menninger of the Menninger Foundation. They spoke over the Columbia network as guests of Watson Davis, director of Science Service.

Hate underlies most of the world's problems—in mental illness, prejudice, selfishness and war. Love is the constructive force within us, balancing the destructive power of hate, Dr. William Menninger stated.

"If psychiatry could succeed in its efforts to help us follow the advice of the Great Teacher who 2,000 years ago said, 'Love thy neighbor as thyself,' then it will have made a real contribution to world peace and security," he concluded.

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## RADIO

Saturday, August 26, 3:15 p.m. EDST

"Adventures in Science" with Watson Davis, director of Science Service over Columbia Broadcasting System.

Mr. Davis will discuss the need of inventions in connection with the present military emergency and the work of the National Inventors Council.

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What kind of ice cream cannot be shipped across state lines? p. 115.

## SOCIOLOGY

What is the most peaceful belief possible? p. 117.

Why will there be no marriage boom during this war? p. 121.

Photographs: Cover, Boeing Airplane Company; p. 115, Firestone News; p. 117, U. S. Steel Corporation; p. 119, U. S. Army; p. 122, 123, U. S. Army Air Force.

## SOCIOLOGY

# Key to Greater Peace

A belief in absolute right and wrong in the world makes it much more difficult to gain international accord. India values harmony rather than rightness.

► IF we can make ourselves believe that there is no absolute "right" or "wrong" in the world, we can come much closer to living in peace.

Dr. Byron L. Fox, of Syracuse University and formerly with the cultural relations program of the U. S. Department of State, in an exclusive Science Service interview in Syracuse, N. Y. explained that India comes closest to achieving harmony in spite of sharp differences in religion and race.

In America we have been brought up to place great value on the "right." We are willing to fight for the right, would "rather be right than President." And the person who holds "wrong" beliefs is regarded as a menace. In general, we are unwilling to compromise with the wrong and label any effort in this direction as "appeasement."

In India, by contrast, it is not so important to be "right" as it is to get along with others even when they are "wrong." Harmony is more valued than "rightness."

In order to build a peaceful world, it is necessary for American social scientists to become aware of their own biases which result from the way Americans are brought up to think and feel. We also need to understand the peculiar cultural biases of other people, Dr. Fox says.

The cold war between the United States and the Soviet Union is usually explained in terms of differences in philosophy or ideology based on differences in our cultural traditions.

But America itself is not without its own internal differences. Actually, Dr. Fox points out, America is striving for four different kinds of world—all at the same time. We are working:

*Toward a one-world:* Through cooperation with the United Nations leading to world government.

*Toward a two-world:* Through such devices as the Atlantic Pact, the rearming of Europe as an ally and military intervention in Korea.

*Toward a three-world:* By building up a "third force" in Europe through the Marshall Plan to serve as a buffer between the United States and the Soviet Union.

*Toward a no-world:* By hanging onto the traditional policy of isolationism and trying to cure world problems through preventive war.

During World War II, scientists discovered the value of "area studies." Instead of studying or teaching the different disciplines without reference to others—economics, anthropology, sociology, history,

language, each in its own classroom—scientists of the different fields collaborated in an over-all study of a single part of the world.

It is time for further cooperation on the part of scientists. Experts in the various areas of the world should get together and compare notes and pool knowledge so as to arrive at an understanding of cultural processes going on in all the various parts of the world and discover a basis for global thinking on world problems.

Dr. Fox is reporting his conclusions in the *AMERICAN SOCIOLOGICAL REVIEW* (Aug.).

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## ENGINEERING

## Water Stretches Steel Tubes to Larger Diameter

► WATER is used in McKeesport, Pa., in the new electric weld mill of the National Tube Company to stretch heavy steel tubes

as much as a half inch in diameter.

The tube to be expanded is put within a form to prevent it from swelling beyond the exact outside diameter desired. A fixed plug is fitted in one end and a movable ram in the other. Three pumps force water into the pipe, the thickness of the steel in the pipe walls determining the amount of pressure needed. When the tube has expanded to fit the form, a die it is called, water pressure is lowered and the expanded tube is ready for inspection.

Pipes expanded by this process are made from heavy plates 40.5 feet in length, from 0.25 to 0.5 inch thick and from about 80 to 110 inches in width. The plates are put in presses which round them into tubes, and the seams are welded inside and out.

Expansion by water under high pressure is the final step. Pressure as high as 3,000 pounds per square inch may be used.

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## SAFETY

## Radioactive Materials Minor Hazard in Fires

► THE small quantities of radioactive materials now being used in several hundred research laboratories present only a minor hazard to firemen in case of a fire, according to the International Association of Fire Chiefs.

These hazards, however, should not be



**PIPE STRETCHED**—Water gushes forth after stretching diameter of steel pipe. Pressure is reduced before the ram is withdrawn from the unusual machine which uses the power of water under pressure to stretch the diameter of heavy pipe as much as one-half inch.



overlooked, these experts state in a report published and distributed by the organization. The booklet is particularly for fire departments that may be called to fight blazes in buildings where radioactive materials are present.

Radioactive materials produced by the U. S. Atomic Energy Commission are in use by over 430 organizations in the United States and 160 institutions in other countries. Over 12,000 individual shipments of 100 different kinds of radioactive substances have been made by the A.E.C. to institutions in the United States and 830 radioisotope shipments have gone to foreign countries.

The report offers safety precautions for

handling radioactive materials, and emergency procedures for fire fighting personnel in areas where such substances are used. It points out that "these radioactive isotopes and isotope-labeled compounds or tagged radiochemicals are utilized in quantities so small that they do not of themselves contribute to the cause of fire, nor do they tend to increase the intensity of combustion."

Because a certain amount of radiation is continuously emanating from radioactive substances, under some circumstances a degree of hazard may be presented to fire fighters. "It is just as important that these hazards should not be unthinkingly exaggerated as it is that they should not be overlooked."

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#### METALLURGY

## Tin as Semiconductor

► TIN is now being added to the small list of the strategic materials that will act as semiconductors, the class of substances that are extremely useful in electrical applications. Semiconductors also show promise as photo-electric cells.

This semiconducting tin, however, is not the same form of tin that is so familiar in tin cans. It is a special form of that element, having a different crystal structure. It is related to normal tin in a way similar to that in which diamond is related to carbon black. These two are the element carbon in different crystalline modification.

The unusual form of tin was first discovered more than 100 years ago. In 1833, in a church in Germany, it was noticed that certain of the organ pipes were crumbling away. This deterioration of the tin pipes made them look much as if they had been attacked by fungus disease, and the crumbling was known as "tin disease."

Some specimens of this different form of tin, or graytin, as it is now called were preserved, although the church organ pipes were replaced. Scientists today are thankful that these specimens were saved, for they find that it is extremely difficult to produce the unusual form of tin without first having seeded the laboratory with the rare crystals.

The reason for needing this seeding crystal is somewhat analogous to the reason that impurities are needed before water freezes at 32 degrees Fahrenheit.

In 1899 Ernst Cohen, a Dutch physical chemist, discovered that the gray metal found when the church organ pipes deteriorated was an allotropic form of tin. Little work had been done since then with this material until about two years ago, when Prof. G. B. Bush of the Physikalisches Institut Technischen Hochschule in Vienna.

He presented a report of his work showing tin's promise as a semiconductor to the International Conference on Semiconductors held in Reading, England, recently. Other scientists had independently come to the conclusion that this unusual metal was

worth investigation. In this country, Dr. R. G. Breckenridge, of the National Bureau of Standards in Washington, is directing his attention to growing single crystals of the substance.

The two most useful materials for semiconductors are germanium and silicon. Just below these two elements in the periodic table is tin. Normal tin shows only the expected metallic traits. The rare crystals, however, are in the in-between land of semiconductors.

Physicists divide matter into three groups when they are discussing its electrical properties. One group is the metallic conductors, those that readily transmit electricity. Another group is the insulators, conducting electricity to a negligible degree. Between these two groups lie the semiconductors.

The transistor is one of the devices developed to make use of the properties of semiconductors. It amplifies electric currents, and consists only of a tiny crystal of germanium with two closely spaced metallic points pressing on it.

Rectifiers are another use for the semiconductors. These materials find application in radar and television sets.

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#### METEOROLOGY

## Quebec Crater May Be Mark of Ancient Meteorite

► THE world has another scar that may divert men's minds momentarily from the lesser but more dangerous possibility of atomic bombs blasting our cities.

Exploration of a supposed meteorite crater in northern Quebec, as reported from Toronto, creates great interest among geologists. It is an ice-filled basin, about two and a half miles across, believed by Dr. V. Ben Meen, director of the Royal Ontario Museum of Geology and Mineralogy, to be caused by a great object from outer

space that smashed into the solid granite crust of the earth. It is larger than Meteor Crater in Arizona.

The meteoritic origin of the Quebec crater has not been bolstered by the finding of iron fragments as in the case of the Arizona scar or similar natural phenomena in Siberia and Australia.

In the Carolinas there are depressions that were once supposed to be caused by similar giant meteorites striking the earth, but this theory is not now in favor. Less spectacular erosion is now believed to be the cause.

Snow and ice even in summer hamper the search for positive evidence of fragments of the Quebec meteorite, and other expeditions will be needed.

The two best authenticated meteorite falls both occurred in Siberia. One on June 30, 1908, in northern Siberia was recorded on earthquake registering instruments but its effect was not nearly that of the scars produced in Arizona and Quebec. On Feb. 12, 1947, another Siberian fall, near Novopokrovka, peppered the earth, but again it was small in comparison with the presumed Quebec occurrence of thousands of years ago, now discovered.

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#### PHYSICS

## Uranium Is Superconductor At Very Low Temperatures

► FURTHER evidence that uranium, atomic bomb material, is a superconductor at extremely low temperatures is offered in Cambridge, Eng.

Drs. B. B. Goodman and D. Shoenberg of the Royal Society Mond Laboratory have found that uranium is a superconductor near absolute zero, 459.6 degrees below zero on the Fahrenheit scale. They also found that the temperature at which the metal became a superconductor varied with the amount of impurity present. They reported their findings in the British journal, NATURE (March 18).

The phenomenon of superconductivity is a sort of "perpetual motion." There has been a certain amount of controversy among scientists as to whether uranium was superconducting near absolute zero.

A startling demonstration of superconductivity can be made by cooling a superconducting metal saucer until it is close to absolute zero. A bar magnet brought close to the saucer sets up an electric current in the metal. This causes a resistance to the further movement of the bar magnet toward the saucer. The magnet then floats above the saucer, literally suspended by nothing, like the legendary Mohammed's coffin.

Although at present time there are no practical applications of the strange behavior of some metals at very low temperatures, researches at these temperatures are helping us to learn more about the properties of matter.

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## MEDICINE

# Polio Quarantine Useless

By the time an epidemic of polio is evidenced, every one has already come into contact with it. However, it is wise to avoid travel, visits and new contacts when possible.

► EVERY summer countless families throughout this land are made to feel like "modern day lepers," as one of them puts it.

The reason is that a child or some other member of the household has come down with polio. Good friends and neighbors who would ordinarily rally to help in time of trouble shun the victim's family.

In some communities you can tell where a polio victim lives, even though no health department quarantine placard is on the door. The neighbors cross the street to avoid passing too close and their children are hastily snatched back if they ride their tricycles or chase a ball across the invisible line.

All this causes needless mental suffering on the part of both the victims and the neighbors and friends who are miserably stifling their natural desire to help and show sympathy.

Strict and heavy quarantining for infantile paralysis does not stop polio epidemics, health and poliomyelitis authorities agree. All attempts to stop polio by quarantine have failed and authorities now consider it foolish to enforce it.

Shunning the victim's family is like locking the barn door after the horse was stolen.

Here is how the National Foundation for Infantile Paralysis explains the situation: By the time an epidemic of polio is noticeable, the whole community has been well seeded with the virus that causes the disease. Every one has already come in contact with it. Those who are susceptible will get polio. Those who are not susceptible will escape being sick.

The incubation period, that is, the period between the time the virus gets into the human body and the person gets sick, is from three to 35 days. Your child may have gotten the virus at the same time your neighbor's child did. One of them may get sick three days later and the other seem perfectly well for a month before he comes down. But for that entire month he would be harboring the virus in his body. So keeping him and his family away from the first victim's family will not protect the second child.

National Foundation and other authorities do advise that you avoid travel and visits with people you do not see regularly and avoid new contacts where possible. If polio is not already in your community, you may not have gotten the virus. So you avoid contacts with people in another community who may already have the virus, even though they are not sick.

While no one knows exactly how polio spreads, authorities are agreed that it is through the intimate contact of close, daily living. Members of a family or household using the same dishes, children in a family or neighborhood playing with each other's toys are examples of this kind of contact. But no one knows until the first case develops whether anyone in the group has the virus. And by the time that first case develops, it is too late to stop its spread. Every one in the group is likely to have it, though they may not all get sick.

If you think of a bull's eye on a target with concentric rings around it, you get a good idea of the polio situation. The bull's eye is the center of the polio situation and the farther out the rings get, the fewer the cases.

A recent careful study of a polio patient's contacts showed this. Examination of stools from all the contacts showed that the patient's mother, father and 80% of his brothers and sisters were harboring the virus.

Among relatives and friends who came often to the house and occasionally spent the night, 20% were harboring the virus. Among acquaintances who came only once in a while for a brief visit and among boys and men delivering milk, groceries and the daily newspaper, only 5% were harboring the virus. Not all of these people actually got sick, they just had the virus in their bodies.

So if you are within the close circles of relatives and friends or neighbors who often stop in for meals, overnight visits and the like, you cannot protect yourself or your children by suddenly shunning all contact with the polio victim's family. But if you are in the outer circle of once a year visits or five-minute calls, you may protect yourself and your family by staying in that circle.

Science News Letter, August 19, 1950

## ARCHAEOLOGY

## Stone Javelin Heads, Much Like Yuma Points, Found

► DIGGING with a bulldozer under 20 feet of dirt deposited by winds and floods of centuries, scientists of the Smithsonian Institution found a site where Indians had camped some 5,000 years ago. The discovery was made at the Angostura reservoir near Hot Springs, S. D.

Under the direction of Richard P.

Wheeler, they dug up some ancient stone javelin heads. With the stone weapons were some animal bones, in such bad condition that it is impossible to tell whether they are the remains of extinct animals or whether they are of species still living.

The javelin heads are very much like the Yuma points found some years ago in New Mexico together with the fossils of extinct animals. The Yuma points are the finest job of flint chipping found in the New World in spite of their great antiquity.

The Angostura site is one of a number of reservoir sites being explored for archaeological treasure before they are flooded.

At the Garrison Reservoir in North Dakota, archaeologists under the direction of G. Ellis Burcaw found a fortified Indian village like others previously found along the Missouri River. The village is encircled by a moat and stockade built on packed earth walls with watchtowers at frequent intervals. It is like the European fortified villages of the Middle Ages, but was built in America before the coming of the white man.

Science News Letter, August 19, 1950



**"LUMPY"**—A manikin developed by the Army's Quartermaster Corps, gives information on the types of design and dimensions of sleeping bags which give the best protection against external cold. Electrical heat units underneath Lumpy's underwear are used to determine heat loss. The tendency of his internal stuffing to bulge in unpredictable places caused him to be dubbed "Lumpy."



## ENTOMOLOGY

**Mold Chemical May Kill Insects and Mites**

► A MOLD chemical distantly related to streptomycin may turn out to be a good insect and mite killer, Drs. George S. Kido and E. Spyhalski have discovered in tests at the Insecticide Testing Laboratory of the Wisconsin Alumni Research Foundation in Madison, Wis.

The chemical is called antimycin A. It comes from an unidentified species of *Streptomyces*. Streptomycin also comes from a species of *Streptomyces*.

The mold chemical kills insects that eat it. It does not kill just by being in contact with the insects' bodies. Houseflies sprayed with a solution of the chemical showed no ill effects, whereas 38% of those that fed on a ball of cotton saturated with it were dead in 24 hours.

Antimycin A is also rather choosy about which insects it kills. German cockroaches and the larvae of the webbing clothes moth were not affected, but carpet beetles were stopped from eating fabrics treated with it.

Among agricultural pests, the chemical was effective against second instar Mexican bean beetle larvae but not against the fourth instar Southern army worm.

Antimycin A can kill other pests besides insects. It is about three or four times more effective against the red spider mite than the commercially available anti-mite chemical, di (p-chlorophenyl) methyl carbamate, or DMC for short.

Details of the tests of this new mite- and insect-killing antibiotic appear in the journal, *SCIENCE* (Aug. 11).

Science News Letter, August 19, 1950

## MEDICINE

**Anti-Tuberculin Vaccine Traced Through Body**

► BCG vaccine against tuberculosis has been made radioactive and is now being tested by Dr. L. Ström of Stockholm.

The radioactive vaccine was made in order to trace its path in the body.

TB germs for the vaccine were made radioactive by growing them in a medium containing radioactive phosphorus. When injected into the muscles or bellies of guinea pigs, these radioactive TB germs were found to spread very rapidly.

Some experiments were made on humans, injecting the radioactive vaccine into the skin. A Geiger-Muller counter specially devised for use on the skin traced the course of the vaccine. It followed the lymph gland drainage of the area and spread within a few minutes.

The activity of the vaccine is now being investigated in the blood and urine. Presence of radioactive phosphorus in the urine

may be the result of the disintegration of the germs and their elimination from the body.

BCG vaccine, named for bacteriologists Calmette and Guérin, is made of living tuberculosis germs that have been greatly weakened. As a result, they should produce immunity against the disease without producing the disease. The vaccine has been more widely used in Europe than in the United States.

His studies were reported at the International Congress on Pediatrics.

Science News Letter, August 19, 1950

## MEDICINE

**Potassium Doses For Infant Diarrhea**

► LIVES of many babies may in future be saved by a new treatment for infant diarrhea devised by Dr. Daniel C. Darrow of Yale University in New Haven. The treatment consists in giving doses of the mineral, potassium.

"The infants looked much more vigorous while the diarrhea continued and did not collapse in the manner that has been observed when no potassium is given," he reported.

"Deficit of potassium is quite regularly present in severe diarrhea," he stated, "and responds to appropriate replacement treatment with a striking decrease in mortality."

The potassium treatment is intended to overcome the acidosis which occurs in infant diarrhea. This acidosis has usually been considered the result of two factors: 1. loss of alkaline intestinal secretions in diarrhea, and 2. failure of the kidneys to secrete an acid urine as they normally do.

These two factors do not adequately explain the acidosis, Dr. Darrow and co-workers found. Instead they discovered that a curious disturbance occurs in cell metabolism as a result of which sodium, the chief alkali of the blood serum and the lymph, or fluid between the cells, passes into the body cells. This depletes the blood alkali and causes acidosis.

At the same time potassium, a normal ingredient of cell fluid, is replaced by the entering sodium and is lost by the body. It is not clear which comes first—the loss of potassium from the cells or the entry of sodium into the cells. Both seem to occur simultaneously.

Dr. Darrow tried giving potassium on the theory that this might check the loss of potassium from the cells and thereby prevent or impede the entry of sodium into the cells.

This treatment, he found, tended to correct the acidosis as well as to restore normal cell function.

His studies were reported at the International Congress on Pediatrics.

Science News Letter, August 19, 1950

**IN SCIENCE**

## MEDICINE

**Be Quiet After Radiation Exposure**

► ANYONE exposed to radiation from an atomic bomb explosion or an overdose of X-rays should lie down and keep quiet if possible. Experiments with rats at the Naval Radiological Defense Laboratory in San Francisco, Calif., show that irradiation with X-rays is much more killing if it is followed by violent exercise.

After irradiation with 600 roentgen units all the nonexercised rats survived, but among those with the same dosage who had less than 30 minutes of exhaustive exercise a day, 50% died, Drs. D. J. Kimeldorf, D. O. Jones and M. C. Fishler report in the journal *SCIENCE* (Aug. 11).

When the dosage was upped to 700 roentgen units, 44% of the resting animals died, but this dosage was fatal to 92% of those who exercised.

Not only did the rays kill a greater proportion among the exercised animals but those that died survived for a shorter time than did the animals without exercise.

Reason for the increased lethal effect of the rays on exercised animals is believed to be the raised metabolic level after exercise. Previous experiments showed that fertilized ascaris eggs, frogs, chick embryos and newborn rats have greater resistance to radiation when kept at low temperature and thus at lowered metabolic activity.

Science News Letter, August 19, 1950

## INVENTION

**Device Helps You Detect Your Own Bad Breath**

► YOU can smell your own breath with an invention for which the government issued a patent recently. No longer will it be necessary to ask a friend if your breath is bad.

With this device, a sample of the breath from within the mouth is taken. Then the sample is discharged into a nostril. The sampler is a tubular affair, constructed in two parts, one of which slides within the other.

To use, one end in which there is a small opening is held between the lips. The other half is drawn outward to create suction to pull air from the mouth into the device. By reverse action, this mouth-air is then forced into the nostril.

Any unpleasant odor in the breath is easily detected, the inventor claims. He is Robert M. Glidden of Haddonfield, N. J., and the patent number is 2,517,657.

Science News Letter, August 19, 1950



# SCIENCE FIELDS

## MEDICINE

### Terramycin Effectively Treats Pneumonia

► "EXCELLENT" results in every case of pneumonia treated, with no failures, is the latest box score for one of the newest mold drugs, terramycin.

The results are reported by Drs. George W. Melcher, Jr., Count D. Gibson, Jr., Harry M. Rose and Yale Kneeland, Jr., of Columbia University College of Physicians and Surgeons and Presbyterian Hospital, New York, in the *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION* (Aug. 12) in Chicago, Ill.

These doctors used the new drug to treat 18 patients with lobar pneumonia due to a pneumococcus and seven patients with atypical or virus pneumonia.

A "dramatic" fall in temperature occurred in all but one patient within 24 to 36 hours after the first dose. In many cases the patients began to feel better even before the temperature started to drop. One man had completely lost the pain in his chest and his cough was much better within 12 hours after the first dose of the new drug.

*Science News Letter, August 19, 1950*

## GEOLOGY

### Old Faithful Not as Faithful as Believed

► OLD Faithful, hitched all winter to a newly-developed "geyser counter," has shown it is not so faithful after all.

The overall average for time intervals between 2,606 eruptions, clocked by a gadget put together by Yellowstone Park rangers from a seven-day clock and an electrical magnet, was 63 minutes and 15 seconds, Ranger Ruben O. Hart writes in the Park bulletin, *YELLOWSTONE NATURE NOTES* (July-August).

But Old Faithful waited only 38 minutes in giving its quickest repeat performance. It stalled for 88 minutes on another occasion.

*Science News Letter, August 19, 1950*

## WILDLIFE

### Good Duck-Hunting Foreseen for 1950

► THERE was good news for most of the nation's duck hunters recently.

Summer surveys on the breeding grounds of wild ducks and geese from the Canadian border north to the Arctic Sea show that there will be nearly as many waterfowl winging south over three of the country's

four major flyways this fall as in 1949. Results of the annual census were reported by Albert M. Day, director of the U. S. Fish and Wildlife Service.

Fair weather and favorable breeding conditions seem to have offset a threatened 25% drop in continental waterfowl populations reported last winter by wildlife biologists in the annual southern census.

For the Pacific Coast, Great Plains and Atlantic flyways, the Fish and Wildlife men now report, the wildfowl situation appears to be the same or only slightly less favorable than last year. Only in the summer breeding areas supplying ducks to the Mississippi Valley flyway has a "moderate" decrease been found.

The waterfowl surveys, this year more extensive than ever before, are made in cooperation with the Canadian Wildlife Service and the various state and provincial governments of the U. S. and Canada.

*Science News Letter, August 19, 1950*

## GENERAL SCIENCE

### War Production Depends on Factories All Over U. S.

► THE job of stepping up production of airplanes, automobiles, war tanks and other complicated equipment needed in war emergencies is not as simple as merely going from an eight-hour to a 24-hour workday. The output of most large concerns depends upon a supply of parts from widely scattered smaller manufacturers.

Airplane production, for example, depends upon the availability of engines. Engine production depends upon a plentiful supply of parts manufactured by many companies. The output of these manufacturers of parts depends upon the availability of raw materials.

Among the engines widely used by the armed services are those manufactured by Pratt & Whitney Aircraft, East Hartford, Conn. A survey just made by this company shows that its subcontractors and suppliers have reached a total of 4,604 concerns. About half of them are located in New England. The others are distributed from New York to California and Texas.

As an example of engine work done outside the East Hartford area, the heat measuring device used on Pratt & Whitney jet engines is made in Springfield, Mass. Also in this same city a concern employing 450 men cuts gears on the Pratt & Whitney engines. And a Connecticut firm makes the precision screws and pins for the same power plants.

Manufacturers of all types of automotive vehicles depend similarly on many widely scattered makers of small but essential parts. A relatively few centers in the United States are recognized for automobile production. Actually parts for automobiles are manufactured throughout the nation by firms located in practically every state.

*Science News Letter, August 19, 1950*

## VETERINARY MEDICINE

### BW, Wartime Weapon, Helps Combat Newcastle Disease

► BW, dread wartime weapon which spells out as bacteriological warfare, is being turned to a peacetime use in Berkeley, Calif., by veterinarians seeking new ways to combat a serious, fast-spreading ailment of chickens, Newcastle disease.

Air saturated with a weak strain of the virus of Newcastle disease is fed to young chickens in special pens at the University of California. The disease spray, instead of striking down the chickens, makes them immune to more virulent forms of the Newcastle virus.

The experiment, being carried on by Dr. Raymond A. Bankowski and associates on the University research staff, is described in the *JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION*.

Virus used in the air-borne sprays was weakened by growing it for long periods in the laboratory in a special broth preparation. It seemed to lose most of its disease-producing properties while retaining the power to immunize.

Ordinarily, chickens are vaccinated against Newcastle disease much as humans are protected against smallpox. The disease virus is injected under the skin.

In the new method the young birds are kept in virus-laden air for periods up to an hour, being gassed by disease germs as a protection against a poultry plague.

*Science News Letter, August 19, 1950*

## SOCIOLOGY

### Outlook for Marriage: No War Boom This Time

► THERE will not be much of a war boom in marriages this time. The reason is there are not very many spinsters and bachelors left in the country.

"At present somewhat more than two-thirds of the population at ages 15 and over is married," report statisticians of the Metropolitan Life Insurance Company here.

The number of married people in the United States, estimated at almost 75 million, is now at an all time high. Only 10 years ago there were 14 and one-half million fewer married men and women in the nation.

While most of the increase in the married population has come from the war and postwar boom in marriages, some of it has come from improvement in mortality which has resulted in fewer widows and widowers.

The number of weddings has been declining from the postwar peak which, the statisticians say, is not surprising in view of the marked depletion of single men and women throughout the country.

*Science News Letter, August 19, 1950*

## PHYSICS

# A-Bomb: Mass Murder Design

A 400-page report, "The Effects of Atomic Weapons," by Atomic Energy Commission and Department of Defense, tells everything possible about atomic attack.

By SAM MATTHEWS

*The volume's flyleaf carries these words: "The Civil Defense Office, National Security Resources Board, commends this publication as a source of scientific information for technical personnel engaged in civil defense planning activities. Its detailed description of the physical phenomena associated with atomic explosions provides certain basic data helpful in the preparation of practical plans for atomic warfare defense."*

► IT is mid-afternoon. An atomic bomb explodes over your city. In the first great flash of light, equal to 100 suns, the buildings stand etched against a sky of fire. Then the buildings fall.

You are two miles from "ground zero," the point directly beneath the bomb's burst. You will be burned, but you will live—if the bomb is no stronger than the one this country dropped on Japan.

Your wife is downtown shopping. You never see her again. Less than half a mile from ground zero, she is hit almost simultaneously by three waves of force, each powerful enough to kill.

The first and the second arrive as one: flash heat, thousands of degrees hot; and invisible, penetrating nuclear radiation, deadly gamma rays and neutrons. Then, a second later, the blast wave strikes. The city is crushed under a giant hand.

Atomic energy is energy on a scale never before released by man. What happens if it is released as a bomb? Suppose, as do the scientists at Los Alamos, that a "nominal atomic bomb" is dropped over your town.

The bomb is the equivalent of 20,000 tons of T.N.T. Expressed in electrical energy, it is roughly equal to the daily output of Hoover Dam, or enough to burn a 100-watt bulb for 263,000 years. Yet this tremendous force can be released in the complete fission of only 2.2 pounds of uranium 235. It happens in less than a millionth of a second.

A blinding ball of fire leaps from the point of burst. The initial temperature of the exploding bomb is more than 1,000,000 degrees Centigrade. The pressure is of the order of hundreds of thousands of atmospheres.

Complete destruction will occur within a mile-wide circle. Small masonry buildings will be engulfed by pressure and collapse completely. Light buildings and homes

will be totally demolished by blast and fire. Factories of steel will be stripped of roofing and siding and only the twisted frames will remain. Buildings will lean away from ground zero as though struck by a hurricane of stupendous proportions.

Chances of anyone surviving within 2600 feet—half a mile—of an atomic explosion are very poor, the scientists say bluntly. Victims within that circle will either be killed by blast, crushed by falling buildings, burned to death or given a greater-than-lethal dose of radiation.

The heat wave which precedes the blast front will last about three seconds. It will set flash fires and char combustible materials. Human beings exposed to it will receive more or less serious skin burns if within two miles of ground zero.

## Heat Travels Straight Line

This heat travels only in a straight line. Hence protection from it is afforded by almost any object. Clothing shields the body, or even a tree trunk. When an A-bomb bursts, AEC's handbook says, drop to the

ground and curl up in a ball to escape the flash.

Burns from flash heat and ordinary flame caused more than half the deaths and three-quarters the injuries at Hiroshima and Nagasaki. There were no fire departments after the explosion. Water pressure in the city mains was practically zero. Twenty minutes after the blast came the "fire storm," wind blowing into the holocaust from all directions, 30 to 40 miles an hour at its height.

## Unmatchable Third Explosion

Atomic weapons have a third explosion of energy, the only one which a conventional explosion cannot match on its smaller scale. This is the wave of invisible energy which produces radiation sickness, striking the single human cell in the bone marrow, the blood and the living tissues.

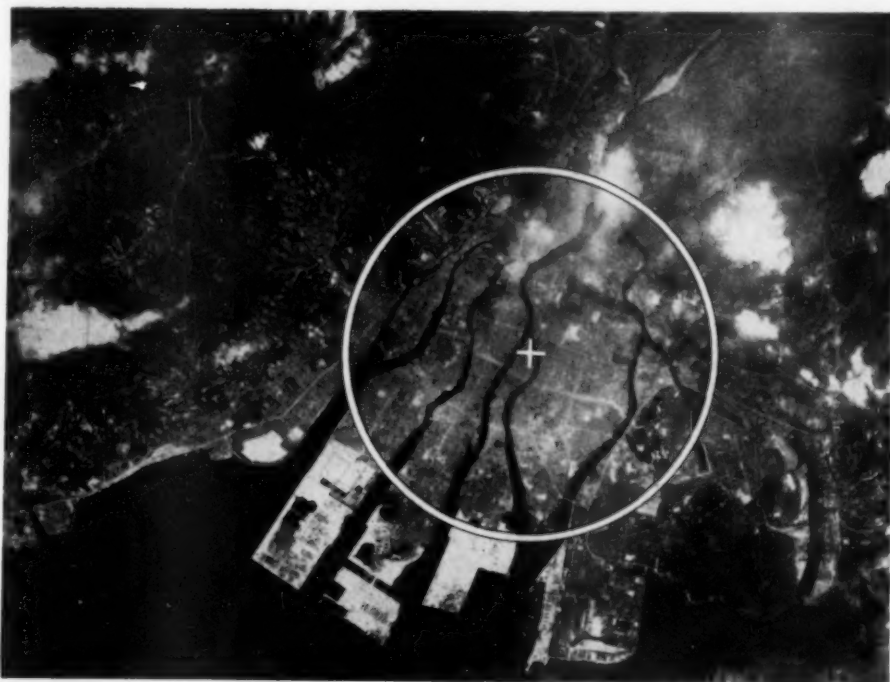
Gamma rays and neutrons are the dangerous particles of energy in this wave to victims of atomic warfare. Shielding from these rays is a matter of reinforced concrete by the foot or solid lead inches thick.

Gamma radiation (X-rays) from a nominal atomic bomb will kill at 4200 feet from the burst. Neutrons are lethal up to half a mile. At 3000 feet from the burst, there is a better than 50% chance you would be killed by this nuclear radiation alone, even



**CHERBOURG SHAMBLES**—Allied forces during World War II reduced the French port of Cherbourg to these ruins. Weeks of bombardment by ordinary high explosives were required to cause such damage as this. Yet one atomic bomb, of the earliest type used on Hiroshima, can turn an entire city into similar shambles in 10 seconds.





**HAVOC OF HIROSHIMA**—The heart of Hiroshima was ripped out by the atomic bomb. The picture was taken by the AAF the day after the bomb fell. A mile-wide area, shown within the white circle, was completely flattened.

if you are shielded by 12 inches of concrete.

A lethal dose of radiation will have these immediate effects: Varying degrees of shock, possibly within a few hours; nausea, vomiting and diarrhea in the following day or two; then fever. Often there will be no pain in the first few days, but merely a feeling of discomfort, marked depression and fatigue.

The early stages of severe radiation sickness may be followed by two or three days when the patient is free from all symptoms, although profound changes are taking place in the body. Then the earlier symptoms reappear. Active illness is soon followed by delirium, coma and finally death. The patient dies usually within two weeks. Infection, internal bleeding, swelling of the throat, loss of hair and degeneration of the sex organs are apt to occur.

#### Effect on Posterity

AEC scientists and genetics experts are extremely cautious in discussing one vital question: will the children or grandchildren of atomic victims be human monsters? Chromosomes and genes, biological factors which control heredity, are changed by radiation. Risk of passing on changes in chromosomes can be reduced if atomic victims "refrain from begetting offspring for a period of two or three months following exposure," the report states.

It adds that this precaution probably would not lessen the risk of passing on changes in the genes. Until large gaps in man's knowledge of radiation in genetics are closed, say the scientists, estimates of

what can or may happen will be little better than guesses.

Will your city be left an echoing ghost town, too "hot" with radioactivity to be entered? If the bomb explodes high in the air, the report says, this hazard will be extremely small. The radioactive residue of the bomb itself will eventually fall to earth, but the small amount of these fission products and the wide area over which they will be dispersed lead military men to discount almost completely any real danger from them.

However, the "base surge" of water from an underwater atomic explosion, or dirt thrown by a bomb exploded either at street level or underground, will be intensely radioactive. Lethal levels of radiation in the wake of such bombs are possible.

If an atomic bomb were a fizzle, unexploded radioactive material might settle over a limited area in high enough concentration to be dangerous. The AEC-Defense Department report says such fizzles are entirely possible. Atomic bombs can explode only partially, breaking apart and scattering their substance into the atmosphere.

#### Radiological Warfare

Radioactivity might be deliberately sown without bombing, as a new weapon of war. In the report, the wraps are officially pulled off the terrifying possibility of radiological warfare.

Radioactive materials can be made in an atomic pile. Small amounts of certain elements can be made to give off tremendous

amounts of radiation when so treated. If these could be spread uniformly over a given area, such as a city, that city might perhaps be denied for habitation or industrial use.

But who will do the spreading, and how? So great would be the difficulties in using radioactive materials that such weapons may be impractical. Nevertheless, warn the atomic scientists, the panic-inspiring potential as a "mystery weapon" makes radiological warfare a grim possibility to be taken into account in civilian defense planning.

#### How to Decontaminate

Ships at Bikini were "hot" after the underwater burst. Much of what was learned at Bikini about decontamination, hitherto kept classified, is revealed in the report.

Gas masks and protective clothing will be necessary for rescue workers. Radiation detectors, such as Geiger counters, will be vital.

Once made radioactive, an object can be: 1) buried deep in the earth or jettisoned at sea; 2) kept isolated until the radiation lessens; or 3) decontaminated below the dangerous level.

In most instances, this means cleaning or removing the surface of the radioactive object, whether it be a tank or an office building. Certain chemicals have been found effective. Blasting with wet sand or high-pressure steam containing a detergent were Bikini-tested measures. Ordinary household cleaners might be used. So too might powerful acids or other corrosives.

#### Danger of Panic

Panic is the final danger in the minds of the atom scientists. "Mass hysteria could convert a minor incident into a major disaster," they say.

The first atomic bomb at Hiroshima killed 78,150 people, which seems far from a "minor incident." But if an American community—anywhere—were to be atom-bombed, panic would strike 80 out of 100 of the physically unharmed survivors. Tens or hundreds of thousands of Americans in other parts of the country might desert their homes and jobs from sheer terror. The great industrial centers of the nation might suddenly become empty shells.

#### Not a World Hazard

Could the entire world be contaminated by deadly radiation from atomic bombs? "It has been calculated," says the report, "that in order to constitute a world-wide hazard, something like a million atomic bombs, of the nominal size, would have to be detonated, roughly one to each 200 square miles of the earth's surface. This clearly represents a highly improbable situation."

## MEDICINE

## Anti-Atherosclerosis Diets

More rigid diets to prevent artery hardening are needed than those previously used. Diets must practically exclude lean meats, skim milk and dairy products.

► PATIENTS and their doctors trying to ward off the dangerous artery hardening condition, atherosclerosis, by a low-cholesterol diet will need to prescribe and follow a much more rigid one than generally used for this purpose, it appears from studies at the University of Minnesota in Minneapolis.

The anti-atherosclerosis diets are based on the assumption that the amount of the fatty substance, cholesterol, eaten is reflected in the amount of this substance in the blood serum. This, in turn, is presumably reflected in a tendency to develop atherosclerosis.

But the amount of cholesterol in the blood serum cannot be significantly reduced, the Minnesota studies show, by diets that allow ordinary amounts of lean meats and permit use of skim milk, and that do not rigidly exclude from every item of cookery and baking all dairy products, eggs and animal products.

The studies, by Dr. Ancel Keys with the collaboration of Dr. Olaf Mickelsen now with the U. S. Public Health Service, Miss Erma v. O. Miller and Dr. Carleton B. Chapman, are reported in the journal, *SCIENCE* (July 21).

The amount of cholesterol in the blood serum of normal men, these scientists found, does not vary with cholesterol intake

from food over a range of something like 250 to 800 mg per day. In other words, one normal person can eat three or more times the amount of cholesterol as another person and still not have any more cholesterol in his blood.

If, however, cholesterol intake is completely eliminated, as in the rice-fruit diet for high blood pressure, the amount in the blood serum goes down markedly and rapidly.

Eliminating cholesterol and all animal fats, which could be a source of the chemical, but allowing vegetable fats caused a rapid return of cholesterol in the blood to a high level in one patient whose blood cholesterol had been markedly reduced. This suggests that vegetable oils in the diet promote accumulation of cholesterol in the blood.

"It is doubtful," states Dr. Ancel Keys who directed the studies, "whether most so-called low cholesterol diets in current use reach critical levels or have significant utility for the purpose of their use."

With a much more rigorous diet, he states, an effectively low level of cholesterol in the blood can be achieved, but "halfway measures may be useless."

*Science News Letter, August 19, 1950*

## GEOLOGY

## Study Evaporation Secrets

► THE case of the vanishing water—trillions of gallons licked up by evaporation each year from the nation's reservoirs—is being studied by government scientists at a saucer-shaped lake outside Oklahoma City.

Secretary of Interior Oscar Chapman announced the start of a 13-month survey of this guinea-pig reservoir by specialists of the U. S. Geological Survey, Weather Bureau and a three-man Naval team.

With complex electronic instruments to measure the sun's energy at lake surface, plus the effects of wind and humidity on evaporation, this "Oklahoma Navy" task force will provide basic data for a new method of measuring water losses from reservoirs in the West's rapidly-growing chain of reclamation and power projects.

Oklahoma's Lake Hefner was picked for the study because it most nearly met the scientists' specifications: a saucer several miles in diameter with a bottom that does not leak (red Oklahoma clay is virtually

watertight). Every gallon of water going in or out can be accurately measured. The difference in a perfect system can be charged to evaporation.

This so-called "water budget" method of measuring evaporation is the old way, however, and none too accurate. The Weather Bureau uses evaporation pans, charting the rate water vanishes under solar radiation and wind and applying the figure to larger bodies of water. Scientists have long suspected that this method is not accurate either—that there is a big and varying difference between evaporation from a shallow pan and from a reservoir, lake or ocean.

Two new techniques will be checked by the new study: "energy budget" calculations based on the sun's radiation, and a "mass transfer theory" built on mathematical equations concerned with the physical removal of water to the atmosphere.

"Such data," said Secretary Chapman, "will be of tremendous importance for the planning of future water resources develop-

ment in the western states." Engineers will use evaporation information in deciding where and how big future dams may best be built.

*Science News Letter, August 19, 1950*

## PHYSICS

## Cosmic Ray Bull's Eye Shot 100 Miles Above Earth

► THE first photograph at 100 miles above the earth of a cosmic ray smashing an atom to bits has been taken from a V-2 rocket.

The photographic plates recovered in this V-2 flight showed more than three times as many cosmic ray collisions at the 100-mile level than appear 20 miles up, preliminary results show.

Prior to the successful photograph from this V-2 rocket, most photographs of cosmic particles smashing atoms were obtained by using free balloons that did not travel higher than 20 miles. Several previous attempts to get good photographs of cosmic rays from rockets were unsuccessful.

The photograph was made possible by a special plate holder designed by Dr. Herman Yagoda and co-workers at the Experimental Biology and Medicine Institute of the National Institutes of Health in Bethesda, Md.

This container protects the fragile photographic emulsions so that they can withstand shocks in the firing and landing of the rocket. It also protects from the vapors of the rocket fuel. Hydrogen peroxide particularly causes rapid destruction of the images.

The energetic cosmic rays that made the stars on the photograph penetrated through the rocket to get a direct hit with the nucleus of an atom in the photographic emulsion. The tiny building blocks of which the smashed atom were made spattered out into the surrounding emulsion. Since many of the particles thus made are charged, they leave tracks in the emulsion that can be seen microscopically in the developed plate.

*Science News Letter, August 19, 1950*

## AERONAUTICS-CHEMISTRY

## Fire-Extinguishing Gases Cut Plane Crash Deaths

► MANY lives would be saved in airplane take-off and landing crashes if better automatic fire-extinguishers were installed, experts in Washington state. The fire-extinguishing gas now used is largely carbon dioxide. More effective gases are available.

In England, methyl bromide is being used exclusively for engine fire protection, Jesse W. Lankford of the Civil Aeronautics Board recently stated. He is an authority on airplane fire prevention and has inspected recently the British systems. Methyl bromide is more effective than carbon dioxide.



In America, little methyl bromide is used for this purpose because the gas is toxic. However, when used within the engine housing, where crash fires start from broken fuel lines and highly heated engines, there is relatively little danger to passengers and crew.

However, another gas, said to be equally as effective and not as toxic as methyl bromide, is now coming into use in American planes. Technically, the gas is monochlorobromomethane, called C-B for short. Both civil and military authorities are fully aware of the need of better fire protection in planes and are pushing forward plans to convert from carbon dioxide to C-B extinguishers as rapidly as practical.

At the present time, as well as during the past few months, giant Air Force bombers of the B-29 type are being converted to

C-B. The same distribution system is being used, with the C-B in liquid form stored in a steel sphere with the fuselage. It requires only one-fifth the operating pressure needed for carbon dioxide.

In the British system utilizing methyl bromide, according to Mr. Lankford, separate containers for the chemical are located in each engine housing, the nacelle. This localizes the supply, in contrast to the more common American system of a central supply piped to the nacelles. In a crash such pipelines may become inoperative.

In the British system the fire extinguisher in each nacelle is connected with an impact switch which triggers automatically at a given deceleration force. However, they can be discharged selectively from the cockpit when it is desirable to do so.

Science News Letter, August 19, 1950

#### METEOROLOGY

## Atmosphere Study Aid

► WIND velocities and temperatures of the little-known part of the earth's atmosphere 20 to 40 miles high will be studied by sound waves in the first large-scale, long-term program of its kind.

In an area 300 miles wide in diameter, explosions of 200 pounds of TNT will shoot sound waves 40 miles into the sky. When these waves reach a heated area of atmosphere, the inversion point, they will be refracted, traveling back to earth 150 miles from their starting point.

Here they will be picked up on specially constructed microphones and recorders. These waves will be in the low frequency range, so low that people cannot hear them. The rarefied upper atmosphere screens out the high frequency waves, Col. Victor Huffsmith, supervisor of the program for the Denver University Institute of Industrial Research in Denver, Colo., explained. A grant from the Air Forces Cambridge Research Laboratories has made the project possible.

In a way similar to that by which seismologists can learn about the structure of the earth's interior by the nature of the waves sent out by earthquakes, so these men will be able to tell certain conditions of the atmosphere by the nature of the waves sent out by TNT explosions. The air velocity and temperature of the particular area of the atmosphere will be determined by the time of travel and by the angle at which the waves return to the earth.

The nine-man staff of Institute researchers will be divided into four teams: Three in the field and one at the Institute in Denver. In the area around Wray, in north-eastern Colorado, nine stations with the TNT will be set up. They will be 25 miles apart, in the shape of a cross. One field team will detonate the TNT in one arm

of the cross, while the other two teams, traveling in a circle 300 miles in diameter, will pick up the sound waves as they travel back to earth.

These field teams will be in constant touch by radio with each other and with the Institute in Denver. Data will be calculated, analyzed and evaluated in Denver.

The technique of measuring sound waves from the upper atmosphere was worked out recently by the Cambridge Research Laboratories and given a short-range test in Panama and Alaska. At that time, army planes dropped bombs in the ocean and stationary teams recorded the sound waves.

This sound wave technique is superior to the use of either balloons or rockets in atmospheric research. Balloons sent skyward to radio back weather conditions can reach maximum elevations of only 20 miles. Although V-2 rockets can soar considerably higher, the expense of the missile and radio equipment is high, and both are often destroyed without providing the information sought.

Science News Letter, August 19, 1950

#### AERONAUTICS

## New Omnicrange Stations Near Completion

► OVER three-fourths of the new-type radio stations that provide "beams" for air pilots to follow are now in operation, officials of the U. S. Civil Aeronautics Administration state.

Slightly over 400 stations will be needed to blanket the entire country with these very high frequency radio beams. Over 300 are already erected and others are rapidly being installed.

This most modern pilot-guiding system, known as the omnicrange, is so called because it provides radio beams in all direc-

tions, instead of only four as in the radio range system it is replacing.

Important, also, is the fact that the beams are of very high frequency which means that they are practically static-free. This is not the case with the beams of the older radio range.

Very high frequency radio waves follow a "line-of-sight" course. Thus they can be picked up by a ground station only some 40 to 50 miles from the ground station in which they originate, as owners of television and FM receivers have learned from experience.

But planes in the air can pick up very high frequency waves at much greater distances because hills and mountains do not cut their path. They can be received at 100 miles or more by planes at 5,000 feet altitude. The maximum reception distance from the stations being erected is approximately 200 miles for a plane at 20,000 feet.

These omnicrange beams will be available for all planes—military, commercial and private. Planes must be fitted with special radio receivers that vary in price from \$400 upward. The receiver is connected to four basic instruments in the cockpit.

One instrument is a radio dial for tuning, another is a bearing selector, the third is a round dial with vertical needle hinged at the top, and the fourth is an indicator to tell whether the bearing shown is to or from an omnicrange.

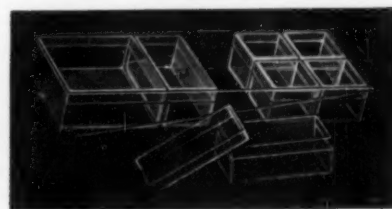
For the benefit of pilots, public and private, the Civil Aeronautics Administration has issued a booklet to tell them how to use the omnicrange. Information on local omnicrange sites can be obtained from most of the CAA regional offices.

Science News Letter, August 19, 1950

*Irish moss*, a seaweed found on the coast from Massachusetts north, yields a gelatinous material called carrageenin, one use of which is to keep cocoa suspended in chocolate milk.

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Pronghorn

► FOR long distances the prong-horn antelope, fastest of all four-footed animals in America, can cover the countryside at 45 miles an hour. In sprints they can put up the pace to close to a mile a minute.

Since the early days of the West, when pronghorns roamed in herds as large as those of the bison, the sharp, snorting whistle of this fleet antelope has sounded over the wide, flat prairies from Texas to Oregon.

Almost hunted to extinction in the early 1900's, the pronghorn under strict game laws has increased to better than 150,000 animals. Today, on the great, privately-owned rangelands of western Texas, annual antelope hunts are held under game-warden supervision. For each antelope killed, the hunter must pay the ranch owner \$40.

The horns of the prongbuck are unique. They are hollow and braced by bony spikes like other horns, but each horn has a short, dagger-guard offshoot like the antlers of deer. Like deer but unlike any other antelope, the prongbuck's horns are shed each year.

The horns are made of hairs, glued together by a strong cement exuded by the skin on the prongbuck's head. At maturity these horns can measure as long as 20 inches. The prongbuck puts them to good use, for upon his fighting efficiency depends his ability to acquire a mate. He parries and thrusts with them in the finest swordplay of the animal world.

A pronghorn can see a coyote and keep tabs on him so far away that a man must use binoculars to find out what the antelope is looking at. This trait of looking long and hard at a suspicious object gives the American antelope a reputation for curiosity. Actually, it is his best defense.

Once startled, the prongbuck breaks and runs like the wind. His pure-white rump serves as a warning to others at a great distance, as well as providing a guide-flag for fawns to follow.

Often the pronghorn will run for the pure competition offered by a passing train or car. In the early days of the West,

the antelope could win consistently over the wood-burning, clanking old locomotives. Whole herds would run parallel to the train, edging closer and closer. Then

in a terrific burst of speed they would cross in front of the engine, waving their white flags in derision at the engineer.

Science News Letter, August 19, 1950

#### MEDICINE

## Irradiated Plasma Danger

► SOME of the blood plasma being collected and stored for use in a possible atomic disaster may actually harm the victims instead of saving them.

If they are suffering from bleeding diseases, as many atomic victims would be, this particular plasma will make them worse because it interferes with the clotting of normal blood.

Warning of this danger is given by Drs. Seymour S. Cutler, Benjamin Burbank and Eugene R. Marzullo, of Long Island College Hospital and Long Island Medical College, Brooklyn, N. Y., in the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (July 22).

This plasma may, on the other hand, be useful for patients whose blood has too much clotting tendency, such as those suffering from thrombosis.

The plasma with the anticlotting tendency is that which has been irradiated with ultraviolet light from the Schumann region of the spectrum, with wave lengths from 1,751 to 2,026 angstrom units.

Ultraviolet light is used to sterilize pooled batches of blood plasma. This is done because some plasmas contain the virus of serum jaundice. Irradiation at 2,537 angstrom units did not cause the change in clotting, the Brooklyn scientists found.

The reason for the change in clotting, or coagulability, after irradiation from Schumann region ultraviolet light is not known. The fact that a body fluid, such as blood, is so profoundly altered biochemically by this part of the ultraviolet calls for more investigation, the scientists point out.

Science News Letter, August 19, 1950

#### AERONAUTICS

## Planes Should Have Stall Resistance

► ALL new airplanes should be designed so that they will have stall resistance. All present planes should be equipped with mechanical stall warning devices. These are the conclusions just presented to the Civil Aeronautics Administration by a special committee studying stalls, the large number of airplane accidents due to stall and methods of prevention.

Stall is a condition encountered by planes when the speed becomes insufficient to assure proper lift or when a plane is operating at an angle of attack on the air ahead which is greater than the angle of attack of maximum lift. Several warning devices have been developed and their use would save many lives. Stall-proof light planes have been developed.

The study was conducted by the National Research Council under contract with the Civil Aeronautics Administration. It was under the direction of Dr. Philip J. Rulon of Harvard University, an experienced pilot who has made other stall studies for the CAA.

In the study many test runs were made and some 40 flight instructors were interviewed relative to maneuvers to be tested. Seven methods of recovering from a straight-ahead, climbing-power stall were evaluated. Also evaluated were 14 methods of recovering from a straight-ahead, cruising-power stall.

The report of the committee, as well as reports of three earlier studies, are available from the CAA. These four studies represent a major contribution to the safety of flying, according to D. W. Rentzell, Administrator of Civil Aeronautics. The CAA can now assist the industry in eliminating, or at least greatly curtailing, the accidents due to stalls in all types of planes, he said. The first stall-proof light plane originated in a CAA development program in 1934, he added.

Science News Letter, August 19, 1950

#### ENTOMOLOGY-BOTANY

## Farmers Battle Nine New Plant Diseases

► NINE new plant diseases popped up to plague the U. S. farmer in 1949, the Department of Agriculture reported.

In Kentucky wheat fields, a blight known as cladosporium herbarum appeared. It has caused serious losses in Europe. A new leaf blight caused complete infection of three fields of broomcorn in Illinois. Sugar beet mosaic, a virus disease, attacked California clover, and a new mold appeared in clover in Oregon and Washington.

There were 19 instances of plant diseases popping up in states where they had not been found before. In many states, 1949's hot dry weather brought greater than normal losses from plant disease, the Department said.

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# Books of the Week

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**AN ANALYSIS OF CULTURE CHANGE IN THE ACKMEN-LOWRY AREA**—John B. Rinaldo—*Chicago Natural History Museum*, approx. 13 p., illus., paper, 25 cents. A study of different pottery types and how they were made. Other artifacts are briefly analyzed.

**ANNUAL REPRINT OF THE REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION:** With the Comments That Have Appeared in the *Journal of the American Medical Association*—Lippincott, 231 p., illus., \$2.00.

**ANTIMETABOLITES**—D. W. Woolley, Conference Chairman—*New York Academy of Sciences*, approx. 184 p., illus., \$2.75. This is a series of papers resulting from a Conference on Development and Uses of Antimetabolites, held by the section of biology, New York Academy of Sciences, Feb. 11-12, 1949.

**THE ARMY AIR FORCES IN WORLD WAR II, Vol. IV: The Pacific: Guadalcanal to Saipan, August 1942 to July 1944**—Wesley Frank Craven and James Lea Cate, Eds.—*University of Chicago Press*, 824 p., illus., \$6.00. Describes air strategy and tactics used in these theaters.

**THE EFFECTS OF ATOMIC WEAPONS**—Samuel Glasstone, Executive Editor—*Gov't. Printing Office*, 456 p., illus., paper, \$1.25. A handbook on the effects of atomic weapons prepared by the Los Alamos Scientific Laboratory. Such topics as shock from underwater and underground atomic bursts, a description of an atomic explosion, physical damage, incendiary effects, decontamination and effects on personnel are discussed. (See p. 122.)

**FIRST COURSE IN PROBABILITY AND STATISTICS**—J. Neyman—*Holt*, 350 p., illus., \$3.50. An introductory text planned for a one-semester course.

**FLAVOR, TEXTURE, COLOR, AND ASCORBIC ACID CONTENT OF HOME-DEHYDRATED VEGETABLES AND FRUITS**—Elsie H. Dawson, Esther L. Batchelder and R. Katherine Taube—*Gov't. Printing Office*, U. S. Dept. of Ag. Tech. Bull. No. 997, 66 p., illus., paper, 20 cents.

**HOW SCIENCE TEACHERS USE BUSINESS-SPONSORED TEACHING AIDS**—Advisory Council on Industry-Science Teaching Relations—*National Science Teachers Association*, 36 p., illus., paper, \$1.00. The results of a survey.

**THE ILLUSTRATIONS FROM THE WORKS OF ANDREAS VESALIUS OF BRUSSELS:** With Annotations and Translations, A Discussion of the Plates and Their Background, Authorship and Influence, and A Biographical Sketch of Vesalius—J. B. deC. M. Saunders and Charles D. O'Malley—*World*, 248 p., illus., \$10.00.

**INTRODUCTION TO ELECTRICITY AND OPTICS**—Nathaniel H. Frank—*McGraw-Hill*, 2nd ed., 440 p., illus., \$5.00. A college text brought up-to-date.

**LOVE IS NOT ENOUGH: The Treatment of Emotionally Disturbed Children**—Bruno Bettelheim—*Free Press*, 386 p., illus., \$4.50. A report on how seriously disturbed children are helped in attaining mental health. A description of the work of the University of Chi-

cago's Sonia Shankman Orthogenic School. (See SNL, Aug. 12.)

**ON SETS OF PROBABILITY LAWS AND THEIR LIMIT ELEMENTS**—Michel Loeve—*University of California Press*, approx. 34 p., 50 cents.

**THE PATHOGENESIS AND PATHOLOGY OF VIRAL DISEASES**—John G. Kidd, Ed.—*Columbia University Press*, 235 p., illus., \$5.00. Contains some of the latest information in the field of virology or the science of viruses. The third symposium held at the New York Academy of Medicine, by the Section on Microbiology, Dec. 14-15, 1948.

**PERCEPTUAL FACTORS IN DELAYED RESPONSE**—Joseph H. Handlon, Jr.—*University of California Press*, approx. 31 p., illus., paper, 50 cents.

**THE RISE OF WORDS AND THEIR MEANING**—Samuel Reiss—*Philosophical Library*, 301 p., \$3.75. The author traces the development of words in relationship to language, sounds, meanings, basic characters and origins.

**SEXUAL FEAR**—Edwin W. Hirsh—*Garden City*, 307 p., \$3.00. Reviews the development of sexual fear through the centuries, from ancient Babylonia to modern times.

**TITANIUM IN STEEL**—George F. Comstock, Stephen F. Urban and Morris Cohen—*Pitman*, 320 p., illus., \$7.50. A critical summary of available data on the use of titanium as a deoxidizer, as a carbon- and nitrogen-stabilizing element and as an alloy metal in steel.

**VOCATIONAL REHABILITATION OF PSYCHIATRIC PATIENTS**—Thomas A. C. Rennie, Temple Burling and Luther E. Woodward—*The Commonwealth Fund*, 133 p., 75 cents. Such topics as transition from patient to worker, the need for rehabilitation services, job finding and placement and research needs are discussed.

Science News Letter, August 19, 1950

## CHEMISTRY

### Household Cleaning Fluid Poisons and Kills

➤ A WARNING to doctors throughout the nation that there are probably many more deaths and cases of poisoning from carbon tetrachloride than are diagnosed is issued in the *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION* (July 15).

In 26 cases traced to this chemical in patients at the Staten Island U. S. Marine Hospital, there were eight deaths, Drs. Robert M. Farrier and Richard H. Smith of the U. S. Public Health Service report.

Most of the victims used the carbon tetrachloride for cleaning clothes or other purposes, and most of them were drinking at the time. Use of alcohol seems to increase acute poisoning and also obscure the cause in the patient's mind.

Failure of the kidney to function properly (anuria) is a prime symptom, but because there is a time interval between the ex-

posure and the renal symptoms the patient seldom associates his trouble with the statement of potential hazard in fine print on the carbon tetrachloride bottle.

Most cases of carbon tetrachloride nephrosis are now non-industrial, the doctors find. Large industries using the chemical have become aware of its hazards and have applied effective safeguards, but it is purchased by individuals for cleaning purposes and often carelessly used. Physicians should be suspicious that this chemical is involved when they diagnose kidney trouble.

Science News Letter, August 19, 1950

## On This Week's Cover

➤ THE U. S. Air Force speedy Stratojet bomber (B-47) is shown in flight, the picture being of the first of the new planes under production at Wichita, Kans., by the Boeing Airplane Company. An experimental model of this plane flew across the continent last year at an average speed of 607.8 miles an hour, making the trip in three hours and 46 minutes.

The swept-back wings of the plane, which are in part responsible for its speed, are shown. It is powered by six General Electric jet engines. It can carry 10 tons of bombs and has a take-off gross weight of 185,000 pounds.

Science News Letter, August 19, 1950



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# • New Machines and Gadgets •

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❁ **FISH BOWL** for display purposes has a tubular glass handle stretching over the top from side to side through which small fishes can swim. Atmospheric pressure keeps the water in the handle after it is once filled.

Science News Letter, August 19, 1950

❁ **FIRE ESCAPE** for emergency use is a fabric affair which forms a sliding trough when the upper end is raised to a window at the end of a fire truck ladder. The lower end can be moved outward to make a curved sliding chute so that users lose speed before reaching the ground.

Science News Letter, August 19, 1950

❁ **REPEATING FLASHTUBE**, a television light source, is a six-inch long tube capable of emitting intense flashes of light, each of very short duration. It is designed for certain types of equipment used in synchronizing its 60 flashes a second with TV's 30 frames per second.

Science News Letter, August 19, 1950

❁ **FLAVOR INJECTOR**, shown in the picture, is for use in adding such flavors as onion juice or powdered spices to the inside of a piece of meat before cooking.



It is a high pressure hypodermic syringe, with a point sharp enough so that it is easily jabbed into the meat.

Science News Letter, August 19, 1950

❁ **ELECTRIC SANDER** and polisher serves as a vibratory massager for tired muscles after the abrasive paper is removed

and a cloth pad substituted. It is a small-size tool that fits the hand easily and makes home refinishing of furniture easy.

Science News Letter, August 19, 1950

❁ **CUTTING BOARD** for the home dressmaker has a surface marked on a grid pattern with markings every inch in each direction. Fabrics can be pinned to the surface of the board, and can be folded lengthwise, crosswise, or on the bias accurately.

Science News Letter, August 19, 1950

❁ **FIRE EXTINGUISHER**—that can be thrown away after use—is a thin-wall metal container with valve head and easily-broken disk release. The container, an Army development, is designed to use trifluorobromomethane as the extinguishing chemical.

Science News Letter, August 19, 1950

❁ **WATER FILTER**, attachable to an ordinary faucet, uses certain resins which have the property of removing minerals in solution by the so-called ion-exchange process. It is a convenient and inexpensive device, usable in home or laboratory, to obtain mineral-free water.

Science News Letter, August 19, 1950

## Do You Know?

The Pakistan Government, Asia, is importing cocoons to boost a silk-production industry on a cottage basis.

Only one of the former famous "whale-back ships" developed particularly to carry ore on the Great Lakes is now in existence; 41 of these long cigar-shaped vessels were built between 1888 and 1896, and none since.

When a heifer and a bull calf are born together as twins, the heifer is usually sterile.

The three principal raw materials used in steel making are iron ore, coal and limestone.

The least popular smell, a scientist states, is the skunk-and-rubber combination used as a warning odor in cooking gas.

Trachoma, a widely-spread contagious eye infection caused by a virus-like organism, has been brought within reach of control by use of the antibiotic drug aureomycin.

Eggs laid in the summer have thinner shells than winter eggs.

Meat tenderness increases from three to 15 days after slaughter, recent studies show.

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## CHEMISTRY

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